MULTIMEDIA UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

# FINAL EXAMINATION

**TRIMESTER 2, 2019/2020**

## BFN3174 – FINANCIAL MODELLING

(All sections / Groups)

5 MARCH 2020
9.00 A.M – 11.00 A.M
(2 Hours)

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**INSTRUCTIONS TO STUDENTS**

1. This question paper consists of **16** pages.
2. Answer **ALL FOUR** questions in **FOUR SEPARATE** Excel spreadsheets in **ONE SINGLE** Excel file.
3. Your Excel file should be named with your **STUDENT ID**, followed by your **NAME**, for example: **1111111623_HISHAM.xls**
4. **SAVE** your answers for all questions in the provided **THUMB-DRIVE.**
5. Please also copy your answers together with formulas onto the given templates of Excel spreadsheets in the **APPENDIX.**
6. Mark distributions are shown in the given templates.

**Using the templates provided in the Appendix of this question paper to model the following 4 questions in the Microsoft Excel:**

## QUESTION 1 (25 MARKS)

On 1/05/2019, you are offered the following bond:

| | |
|---|---|
| Face value | : RM1,000 |
| Coupon rate | : 10% |
| Coupon payments | : 2 times per year, i.e. 1/1/2019, 1/07/2019, … |
| Bond price | : RM980 |
| Maturity date | : 1/07/2025 |

Using the template provided in the Appendix, carry out your modelling on the bond's yield to maturity (YTM) using both XIRR and YIELD formula.

## QUESTION 2 (25 MARKS)

Considering the following data concerning IndoChina Company (IndoChina's stock is not currently listed on a stock exchange).

- Expected return for the market portfolio, $E(r_M) = 12\%$
- Cost of debt, $r_D = 6.5\%$
- Corporate tax rate, $T_c = 30\%$
- Covariance between IndoChina Company's stock prices and market portfolio index prices, $Cov(r_{ABC}, r_M) = 0.3$
- Value of debt, D = RM12,000,000
- Risk free rate, $r_f = 3.5\%$
- Variance for the market portfolio, $Var(r_M) = 0.5$
- Value of equity, E = RM40,000,000

Using the template given in the Appendix to model:

a. the cost of equity for IndoChina Company. **(8 marks)**

b. the weighted average cost of capital (WACC) for IndoChina Company. **(7 marks)**

**Continued...**

c. Suppose Ivanka Company issues its stocks in an initial public offering (IPO). After the IPO the company has 3,000,000 shares, worth RM20 each. Model the WACC for Ivanka Company after the IPO.

**(10 marks)**

## QUESTION 3 (25 MARKS)

Thunder Aviation has just announced results that the free cash flow (FCF) for the past year is RM95 million. An experienced analyst believes that the growth rate of the Thunder Aviation for the next 10 years will be 10% per year and that after 10 years the growth rate will be 8% annually. Thunder Aviation's weighted average cost of capital (WACC) is 12%, and the company has 40 million shares outstanding.

a. Value the shares assuming that the FCFs occur at year-end. Thunder Aviation has RM20 million debt and RM5 million cash reserve.

**(20 marks)**

b. Suppose that the FCFs occur mid-year. What would your answer (a) be now?

**(5 marks)**

## QUESTION 4 (25 MARKS)

a. Use the Black-Scholes model to price a put option on a stock with the following information:

| | |
|---|---|
| Current stock price (S) | = 25 |
| Exercise price (X) | = 20 |
| Time to maturity (T) | = 0.75 |
| Risk-free rate (r) | = 5% |
| Standard deviation (sigma) | = 30% |

**(10 marks)**

b. Using results produced in (a), produce data-tables that show:

(i) the sensitivity of the Black-Scholes put price to changes in the exercise price, X.

**(5 marks)**

**Continued...**

(ii) the sensitivity of the Black-Scholes put price to changes in risk free rate, (rf).

**(5 marks)**

(ii) the sensitivity of the Black-Scholes put price to changes in the stock volatility, standard deviation (sigma).

**(5 marks)**

Note: please refer to the templates given in the Appendix for this question.

**End of Page**

# APPENDIX: TEMPLATES FOR ALL QUESTIONS

The given templates in this Appendix are:

1. to be followed exactly when carrying out your modeling in the Microsoft Excel for all of the four given questions.

2. to be used to record answers produced in your Excel spreadsheets for all of the four given questions as follows:

   - Each computed value should be recorded on the correct cell, as it appears on your actual excel spreadsheet in the Microsoft Excel.

   - Formula for each recorded value should be recorded in the 'Excel Formula' column.

   - Formulas for more than one column can be entered in one single excel cell under the Excel-Formula column and spaced from one another with a slash sign "/".

**ANSWER FOR QUESTION 1 (25 MARKS):**

| | A | B | C | D |
|---|---|---|---|---|
| 1 | **INPUT ZONE** | | | |
| 2 | the date of the purchase | | | |
| 3 | Previous coupon payment date | | | |
| 4 | Next coupon payment date | | | |
| 5 | Face Value (RM) | | | |
| 6 | Annual coupon rate | | | |
| 7 | Bond price (RM) | | | |
| 8 | | | | |

**ANSWER FOR QUESTION 1 (25 MARKS) (CONTINUED...):**

| | A | B | C | D | |
|---|---|---|---|---|---|
| 7 | Bond price (RM) | | | | |
| 8 | | | | | |
| 9 | **MODELING ZONE** | | **EXCEL FORMULA** | | |
| 10 | Semi-annual coupon ($) | | | **(1 marks)** | |
| 11 | Days since last coupon date | | | **(1 marks)** | |
| 12 | Days between last coupon date and next coupon date | | | **(2 marks)** | |
| 13 | | | | | |
| 14 | Accrued interest | | | **(2 marks)** | |
| 15 | | | | | |
| 16 | Invoice price (bond price + accrued) | | | **(2 marks)** | |
| 17 | | | | | |

**ANSWER FOR QUESTION 2 (25 MARKS):**

| | A | B | C | D |
|---|---|---|---|---|
| 18 | Date | Bond cash flow | EXCEL FORMULA | |
| 19 | | | | (2 marks) |
| 20 | | | | (5 marks) |
| 21 | | | | |
| 22 | | | | |
| 23 | | | | |
| 24 | | | | |
| 25 | | | | |
| 26 | | | | |
| 27 | | | | |
| 28 | | | | |
| 29 | | | | |
| 30 | | | | |
| 31 | | | | |
| 32 | | | | (2 marks) |
| 33 | YTM (XIRR formula) | | | (4 marks) |
| 34 | YTM (YIELD formula) | | | (4 marks) |
| 35 | | | | |

**ANSWER FOR QUESTION 2 (25 MARKS):**

| | A | B | C | D |
|---|---|---|---|---|
| 1 | INPUT ZONE | | | |
| 2 | $E(r_M)$ | | | |
| 3 | $r_D$ | | | |
| 4 | $T_C$ | | | |
| 5 | $Cov(r_{Abby}, r_M)$ | | | |
| 6 | D | | | |
| 7 | $Var(r_M)$ | | | |
| 8 | $r_F$ | | | |
| 9 | Value of Equity E before the IPO | | | |
| 10 | Share Price | | | |
| 11 | Number of Shares | | | |
| 12 | | | | |

**ANSWER FOR QUESTION 2 (25 MARKS) CONT…:**

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 13 | **MODELLING ZONE** | | **EXCEL FORMULA** | | |
| 14 | A. Finding the company cost of equity. | | | | |
| 15 | β | | | *(4 marks)* | |
| 16 | $r_E$ | | | *(4 marks)* | |
| 17 | | | | | |
| 18 | B. Finding the company WACC. | | | | |
| 19 | | | | | |
| 20 | V=D+E | | | *(3 marks)* | |
| 21 | WACC | | | *(4 marks)* | |
| 22 | | | | | |
| 23 | C. WACC after the IPO | | | | |
| 24 | | | | | |
| 25 | Value of Equity after the IPO | | | *(3 marks)* | |
| 26 | V=D+E | | | *(3 marks)* | |
| 27 | WACC | | | *(4 marks)* | |
| 28 | | | | | |
| 29 | | | ***Total Mark*** | ***(25 marks)*** | |
| 30 | | | | | |

**ANSWER FOR QUESTION 3 (25 MARKS):**

| | A | B | C | D |
|---|---|---|---|---|
| 1 | **INPUT ZONE** | | | |
| 2 | Base year FCF | | | |
| 3 | WACC | | | |
| 4 | High growth rate, $g_{high}$ | | | |
| 5 | Normal growth rate, $g_{normal}$ | | | |
| 6 | Number of high growth years | | | |
| 7 | Debt | | | |
| 8 | Cash | | | |
| 9 | Number of shares | | | |
| 10 | | | | |

**ANSWER FOR QUESTION 3 (25 MARKS) (CONTINUED...):**

| | A | B | C | D |
|---|---|---|---|---|
| 11 | **MODELLING ZONE** | | **EXCEL FORMULA** | |
| 12 | Term 1 factor: $(1+g_{high})/(1+WACC)$ | | | *(3 marks)* |
| 13 | | | | |
| 14 | Term 1: PV of high-growth cash flows | | | *(3 marks)* |
| 15 | Term 2: PV of normal-growth cash flows | | | *(3 marks)* |
| 16 | Enterprise value | | | *(3 marks)* |
| 17 | Add cash | | | *(2 marks)* |
| 18 | Subtract debt | | | *(2 marks)* |
| 19 | Value of equity | | | *(2 marks)* |
| 20 | | | | |
| 21 | Share value | | | *(2 marks)* |
| 22 | | | | |
| 23 | **b.** If cash flows occur in mid-year, then: | | | |
| 24 | Value of equity | | | *(3 marks)* |
| 25 | Share value | | | *(2 marks)* |
| 26 | | | | |
| 27 | | | ***Total mark*** | ***(25 marks)*** |

**ANSWER FOR QUESTION 4 (25 MARKS):**

| | A | B | C | D |
|---|---|---|---|---|
| 1 | **INPUT ZONE** | | | |
| 2 | Stock Price (S) | | | |
| 3 | Exercise Price (X) | | | |
| 4 | Risk-free rate ( r) | | | |
| 5 | Time to Maturity (years) (T) | | | |
| 6 | Standard deviation (Sigma) | | | |
| 7 | | | | |
| 8 | **MODELLING ZONE** | | **EXCEL FORMULA** | |
| 9 | $d_1$ | | | (2 marks) |
| 10 | $d_2$ | | | (2 marks) |
| 11 | | | | |
| 12 | $N(d_1)$ | | | (2 marks) |
| 13 | $N(d_2)$ | | | (2 marks) |
| 14 | | | | |
| 15 | | | | |
| 16 | Put price | | | (1 mark) |
| 17 | | | | (1 mark) |
| 18 | | | | |

**ANSWER FOR QUESTION 4 (25 MARKS) (CONTINUED...):**

| | A | B | C | D |
|---|---|---|---|---|
| 19 | SENSITIVITY ANALYSIS | | | |
| 20 | Exercise price | Put Price | EXCEL FORMULA | |
| 21 | | | | (2 marks) |
| 22 | 10 | | | (3 marks) |
| 23 | 15 | | | |
| 24 | 20 | | | |
| 25 | 25 | | | |
| 26 | 30 | | | |
| 27 | 35 | | | |
| 28 | 40 | | | |
| 29 | 45 | | | |
| 30 | 50 | | | |
| 31 | 55 | | | |
| 32 | 60 | | | |
| 33 | | | | |

**ANSWER FOR QUESTION 4 (25 MARKS) (CONTINUED…):**

| | A | B | C | D |
|---|---|---|---|---|
| 34 | Risk Free Rate | Put Price | EXCEL FORMULA | |
| 35 | | | | (2 marks) |
| 36 | 5.0% | | | (3 marks) |
| 37 | 5.5% | | | |
| 38 | 6.0% | | | |
| 39 | 6.5% | | | |
| 40 | 7.0% | | | |
| 41 | 7.5% | | | |
| 42 | | | | |

**ANSWER FOR QUESTION 4 (25 MARKS) (CONTINUED…):**

| | A | B | C | D |
|---|---|---|---|---|
| 43 | Standard Deviation | Put Price | EXCEL FORMULA | |
| 44 | | | | (2 marks) |
| 45 | 5% | | | (3 marks) |
| 46 | 10% | | | |
| 47 | 15% | | | |
| 48 | 20% | | | |
| 49 | 25% | | | |
| 50 | 30% | | | |
| 51 | 35% | | | |
| 52 | 40% | | | |
| 53 | 45% | | | |
| 54 | 50% | | | |
| 55 | 55% | | | |
| 56 | | | | |
| 57 | | | Total | (25 marks) |
| 58 | | | | |